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ABSTRACT

The Restructuring Education in the Sciences for Industrial Alignment (RESIA) project examined the feasibility of combining college science faculty and industrial experts to produce instructional materials. These materials were intended for on-the-job training and college credit. Through informal contact, professors were identified who were willing to be involved in the development of training materials and who would subsequently offer these materials in their own classes for college credit; in turn, companies were identified that were willing to provide an industrial expert and trainees to try out the developed training materials. The college faculty and industrial representatives were to work together. During the course of the project, which consisted of initiation, writing, production, and evaluation, the following problems were identified: companies were reluctant to carry the full cost of development, but resisted sharing costs with potential rivals; faculty were reluctant to assign college credit; the original consortium approach hindered the project. The experiment showed the following results: (1) an instructional designer is an essential component of the development process; (2) industrial representatives and faculty added important dimensions; and (3) industry welcomed input from qualified faculty and used the materials developed. (Author/KC)

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INSTRUCTIONAL DESIGN PARAMETERS IN INDUSTRY

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Paper prepared for round table on 20 March, 1982, at the American Educational Research Association's Annual Meeting.

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Running head: Design Parameters

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Abstract

The RESIA* project examined the feasibility of combining college science faculty and industrial experts to produce instructional materials. These materials were intended for on-the-job training and college credit. Problems identified were: companies were reluctant to carry the full cost of development, but resisted sharing costs with potential rivals; faculty were reluctant to assign college credit; the original consortium approach hindered the project. The experiment showed: an instructional designer is an essential component of the development process; industrial representatives and faculty added important dimensions; industry welcomed input from qualified faculty and utilized the materials developed.

* Restructuring Education in the Sciences for Industrial Alignment, a project funded by the National Science Foundation, 1977-1980. The project was conducted as a feasibility rather than as a research study. The project, originally funded on a three-year basis, was extended for eighteen months. The author became involved as an instructional designer at the beginning of the extension period.

The author of this article is no longer with the RESIA Project, but is currently a Senior Instructional Designer at Arthur Andersen & Co., St. Charles, Illinois.

Instructional Design Parameters in Industry

Introduction

Research Methodology

Since the RESIA project was in the nature of a feasibility study, the data collected were through observation. The methodology used can best be described as: Problem definition → Potential solution → Redefinition of problem → Potential solution. The level of research is similar to that described by Snow (1972) as level 1, the level of hypothesis formation. Travers (1978) states, "Another name for this kind of research is fact gathering, but facts are not collected at random. Fact collectors are guided by a primitive theory of what to expect at Level 1... The purpose is to establish the existing state of affairs."

Background

Adult education, often referred to as continuing education, takes place in a variety of settings. High schools, two- and four-year colleges, universities and technical institutions all offer continuing education. These educational environments may be academic (leading to a degree), vocational (leading to certification), or informal (courses selected by personal preference).

Continuing education in business and industry may also be academic, vocational (usually with an in-place program) or informal (job-

familiarization activities). The variations in their educational programs depend, in part, on the size and nature of the company, the degree of skill required of the employee, staff turnover, and the company's perception of the need for formalized training.

In industry, the ordinary worker receives on-the-job training, which may or may not be formalized. These workers do not need a degree, but those with high school or college vocational training have a definite advantage in the job market, as their training has provided them with necessary skills.

In most industries, there is also a need for people with more formal academic education. For example, the oil industry needs people with degrees in geology or in engineering; the extraction industry needs people with backgrounds in chemistry and/or chemical engineering. Each company within a specific industry, such as extraction, may need people with considerably different emphases in their academic knowledge.

A common complaint of industry is that "college professors" tend to emphasize theory, so that students seldom become aware of real industrial needs and the practical aspects of any specific industry. As a result, the firm has to spend time, effort, and expense to retrain the college graduate in these practical aspects. This is particularly true in the engineering, chemical, and biological sciences. Professors in these academic areas usually feel a need to generalize (i.e., emphasize theory) since they cannot be certain which of the many industrial fields their students will eventually enter.

Context of the Problem

Theoretically, it would seem valid to suppose that there must be some way of enabling professors to provide an education in both the theoretical aspects of their fields and examples of practical applications of that theory.

Initial discussion with college faculty indicated they did not feel that they or their courses could gain any benefit from industrial experts. Turning the question around, however, (could you help industry to improve its on-the-job training) brough a much more interested attitude. Finally, professors were identified who were willing to be involved in the development of training materials and who would subsequently offer these materials in their own classes for college credit.

When approached, companies were very willing to work with professors to improve their own in-house training. They also felt that training developed by the professors, aided by a selected industrial expert, would provide material for the professor to use in his/her own classroom, thus enhancing the education received by the students, and improving the quality of graduates hired by the industry. Specific companies were identified that would be willing to provide an industrial expert and trainees to try out the developed training materials.

Statement of the Problem

Is it feasible to assume that a successful system could be developed to:

- Meld the expertise of an industrial representative with the expertise of a college faculty member, in an appropriate academic area?
- Create instructional materials that would be used by the company in training and by the college for credit?

Description of the Project

Initial Approach

RESIA is an acronym for "Restructuring Education in the Sciences for Industrial Alignment." The RESIA project was an experiment in melding industry and higher education in the development of training. A consortium of higher education institutions was formed, centered at Weber State College in Utah.

Several previously identified companies were anticipating faculty input as a means of improving industrial training, and expected the results to enhance the related academic courses. The aim of the project was to produce instructional materials for a specific company by having a consortium faculty member work closely with an industrial representative.

The director of the project was a faculty member of the Weber State College Science Department. He identified four phases for a project: Initiation, Writing, Production, and Evaluation. During the initiation phase, the industrial representative was selected by the targeted company; a consortium faculty member was identified as having the appropriate academic expertise; and an initial agreement on what was to be produced was obtained with signatures from the project

director, the industrial representative and the faculty member. Signatures of these people had to be appended on completion of each phase. During the writing phase, the professor produced written materials describing the concepts to be learned, and scripts for audio-visual presentations. These were approved by the industrial expert. Scripts were sent to the faculty member's own college Instructional Development Center. Finally, the materials were tried out and evaluated.

During the initial stages of the project, it was assumed that the project funding should pay all development costs. Long term plans involved developing funding for personnel salaries and benefits, plus overhead costs, and for industry to pay the cost of actual production.

Redefinition of the Problem

By about half way through the project, it was clear that such a system was feasible. However, as the project progressed, three new problems were identified. The problems can be summarized as follows:

1. The consortium approach created problems in maintaining control of individual projects, particularly when the project director is a faculty member at one of the institutions and can only devote part-time to the project.
2. Experts in the production aspects of instructional development do not usually have an instructional design background. Therefore, they are unable to advise concerning the educational quality of materials produced, though they are able to ensure technical

quality of these materials. As a result, although the companies were satisfied since the materials were of better quality than they had had before, the college professors refused to assign credit to, or use, the developed materials.

3. The industrial companies found costs acceptable when asked to pay (a) the materials and production costs (photographic supplies and development, printing, etc.), or (b) a percentage of all actual costs (salary of persons involved). When asked to pay the full development cost (including salaries, benefits and overhead) most of the companies approached found the costs too high. An attempt to spread costs between companies with similar activities/ products failed because of inter-company rivalry.

Discussion

During the initial approach, all costs were assigned against RESIA funding. The procedure developed (i.e., project phases) worked well while materials being developed were written materials only. However, later projects required audio-visual materials and it was decided to have these produced, for any specific project, by the Instructional Development Center attached to the same institution as the assigned faculty member.

The first problem that arose was the lack of coordination between the Instructional Development Centers and the project director. This was due partly to the distance between institutions and partly to the autonomous nature of each institution. As the products neared completion, the lack of coordination increased. The project director had no

background in instructional design or development. Recognizing this, the Instructional Development Centers tended to act independently, going directly to the company involved rather than working through the director. As a result, the director was unaware of decisions being made until he received the bill for increased costs. The director began to look for a solution that would return control of the individual projects into his hands.

The first attempt at a solution was to hire a full-time administrative assistant whose duties included acting as a controller of each project and identification of new companies for new projects. This partially solved the control problem, but unilateral decisions were still being made because of the lack of expertise in instructional development of either the director or the director's assistant.

This problem originally arose as a result of needing to produce audio-visual materials. When these had been finalized to the satisfaction of the industrial experts involved, a second problem was defined.

The audio-visual materials developed were, technically, of excellent quality, with the result that they were appreciated by the company for which they were produced. The educational quality, however, was such that the faculty person involved refused to use the materials in the classroom or to assign any credit-hour value to the product. This, despite the fact that each had originally agreed to develop materials of a specific, though approximate, number of credits.

The arguments used by the faculty were: the content was not of sufficient depth; the quality wasn't satisfactory; the materials wouldn't fit into the course being presented; they simply weren't

hands of the director. This proved to be the case. However, the projects that used the designer and the development team also used experts at the same college.

A decision was made to assign a project out to the Instructional Development Center of another institution. As the designer was busy with other projects and the administrative assistant had developed a basic understanding of the development process, the administrative assistant was assigned to supervise the project. While a fair degree of control was maintained, it became clear that the designer is an essential element of the development process, needed to ensure materials are of high quality, satisfactory to both the industrial representative and the faculty member. This was supported by the fact that only when the instructional designer was involved in development did the faculty member use the product in the classroom.

During the period when the development team was being organized, the other aspect of the problem (increasing cost) was considered. It was felt that the industrial representative would be less inclined to approve additional costs without consultation with the director if the company was responsible for these costs. The initial analysis indicated a company would be willing to pay actual development costs, such as photographic supplies, film development costs, printing, etc. This type of costing was incorporated into the next project. Soon after the change, it became clear that alternate funding for the project was needed if the project was to continue on a long term basis. Funds available through the State Educational System were limited, so it was decided to try assigning the full costs (salaries, benefits, and overhead as well as production costs) to the company

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concerned.

This did not prove to be a viable solution. While industrial management recognized a need for training, they usually were unaware of the actual cost to their company of on-the-job training. Expenses are "hidden" because the foreman seldom has to account for time (his own or the trainee's) that is spent in training new employees. The cost of developing training materials is, however, highly visible. Management proved reluctant to bear the full cost of development, although they appeared willing to pay for production costs and up to about 50% of personnel costs.

An attempt was made to solve this problem by spreading the cost among several companies from a related industry. The idea was to produce materials suitable for all, then make them "company specific". When round-table discussions were held, each industrial representative proved too suspicious of the other companies (considered to be rivals) and the efforts foundered.

The problem of having faculty use the materials was not completely solved during the life of the RESIA project, because some faculty were still reluctant to give credit for time spent on reviewing the audio-visual materials. A possible solution would be if faculty could be persuaded to allow "extra" credit, i.e., a chance to improve one's grade, or "partial" credit, such as ½ credit hour for completing certain modules of instruction.

Faculty will be more open to this possibility if they can be brought to realize that during lectures, they can still emphasize the theoretical aspects of the science involved, but may enhance their instruction by allowing students to review the audio-visual materials

as "practical applications" of the theory, i.e., as enrichment materials.

A second unresolved problem concerned costs. The current economy is not viable for the institution to provide instructional development services to companies in the locality without recovering the costs in some way, perhaps by the institution making full use of the products, or by industry paying a large portion of the costs. Unfortunately, the same economy makes industry highly resistant to paying the full costs. Most industrial firms are reluctant to share the product (thus reducing costs to any one firm) with potential rivals.

A possible solution is for the educational institution, at the beginning of a project, to provide the money for developing the instructional product with a specific company paying for all production costs and a specific percentage of other costs. The company would retain rights to all slides taken on its premises and to use the original product, but the institution would retain copyright of all written materials. The educational institution could recover more costs by revising the script for use with other industrial firms. Over a period of time, the institution would be able to recover its original outlay.

Since some companies have "proprietary" materials, it should be optional for the company, if it chooses to do so, to either pay full costs of anything considered proprietary; or foot the entire bill, if the company does not want potential rivals to have access to any part of the product (even when the product does not contain proprietary information).

The major parameters for designing instruction in industry are:

costs, industrial and academic expertise, the instructional designer, the nature of the skills and knowledge required for the tasks.

Costs must be made palatable, since the company's aim is to make a profit and, normally, training costs are an invisible factor in the overhead costs. Some form of cost/benefit analysis which made such costs visible would be a valuable asset.

In developing training in any industry, the expertise of the industrial representative ensures the end project fills the training need. The use of a college or university faculty member can add academic understanding of processes in the industry and improve on-the-job safety techniques (e.g., handling dangerous chemicals). The instructional designer's skills in the areas of task and content analysis enhance the instructional quality of designed materials to the point where it will be of real value in both the vocational and the academic setting.

One other parameter is that of the skills and knowledge necessary for the specific tasks required in the training. While these were not discussed in this paper, they are of vital importance in designing instruction in industry.

Some hypothese developed from this study are:

1. Industrial education is improved through the use of college faculty as subject matter experts.
2. Science education in colleges and universities is improved by designing modular packages showing industrial applications of the theoretical concepts. Such packages are improved by input from industrial experts.

3. The instructional designer is an essential element in the development of quality instructional materials whether for use in industry or for use in an educational institution.
4. Students have greater retention of science theory if they know some of the practical applications of that theory.

Conclusions

By the time the project was terminated, the following conclusions were made:

1. A viable system could be developed to combine the expertise of industrial representatives and college faculty to produce training materials.
2. The industrial representative, the faculty member and the instructional designer each added essential dimensions to the quality of the final product. All three are needed if the product is to be satisfactory to and used by both the industry and the institution involved.
3. Industry welcomed the input from qualified faculty and utilized the materials produced.
4. Faculty tend to resist using materials that are "industry specific" in their courses.
5. Cost of developing training material will usually need to be split between the institution preparing the product and the company to receive these materials, or spread among companies. The latter solution is difficult to apply as many industrial firms regard others in the same industry as potential rivals.

References

Snow, R.E. Theory construction for research on teaching. In R. M. W. Travers (Ed.) Second Handbook of Research on Teaching. Chicago: Rand McNally, 1973

Travers, R. M. W. An Introduction to Educational Research. New York: Macmillan Publishing Co., Inc., 1978